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# **Impact of Export Composition on Economic Growth in South Asia**

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## **Abstract**

The primary objective of this study is to analyze the impact of export composition on economic growth in South Asian countries (Bangladesh, India, Pakistan, and Sri Lanka) from 1990 to 2013. Vertical and horizontal export diversification and their relation with economic growth are also analyzed in this study. Export composition, vertical and horizontal exports diversification are augmented in Cobb-Douglas production function in three models respectively. Herfindal index is used for measuring the export composition that reveals export diversification exists in South Asian countries. Results showed that export composition and vertical export diversification have inverted U relationship with economic growth, while horizontal export diversification has U shape relationship with economic growth. Moving from primary exports to manufacture exports linked with economic growth via externalities of learning by doing as vertical exports are positively related with GDP. Government should encourage the exporters to increase diversification in their export portfolio and provide incentives and technical assistance for research and development to move the exports from primary sector to manufacturing sector.

**Keywords:** Exports, Economic Growth, Specialization, Diversification, South Asia

**JEL:** C23, F43, O41, O53

## **1. Introduction**

Economic growth is the primary focus of the policymakers especially in the developing countries and the export led growth hypothesis is one of the most highlighted strategies for them. The hypothesis is true in developing countries (Ahumada & Sanguinetti, 1995; Ibrahim, 2002; Awokuse, 2003; Shirazi & Manap, 2005; Dreger & Herzer, 2011; Palley, 2011; Araujo & Soares, 2011; Abbas, 2012) and rejected in developed countries (Ibrahim, 2002; Afzal et al., 2009; Kubo, 2011). Exports are not only important for earning foreign exchange and boost the economic growth (Munemo, 2011) but also influence government revenue, investment, import capacity and producer revenue (Ferreira, 2009).

Romer (1990) emphasizes export composition at aggregate or disaggregate level referring to the specialization or diversification respectively. On aggregate level, countries could enjoy the comparative advantage by adopting export specialization by efficiently allocating their resources along with the lower opportunity cost (Ricardo, 1817). Specialization is an integral part of economic development and allows the countries to trade with the richer countries. It also allows concentration in production and relatively narrows the range of high productivity activities (Kaulich, 2012). On the contrary, export diversification introduced the concept of export-mix commodities in exports portfolio, and can be categorized into two types; horizontal and vertical. Horizontal export diversification refers to primary export-mix in such a form that reduces the volatility of international commodity prices or adopting and introducing new sectors in exports. Vertical export diversification is the increase in the value of existing commodity with the help of innovation by shifting from producing primary to manufactured commodity.

According to the exogenous growth theory (Ramsey, 1928; Solow, 1956; Cass, 1965) and endogenous growth theory (Romer, 1990; Rebelo, 1991), diversification positively impacts on economic growth in the long run as it is the source of high rates of economic growth and has dynamic spillover effects. The spillover effects include knowledge spillover, improved production techniques, more efficient management, labor training and increased competitiveness (Herzer & Lehmann, 2006). According to Smith (1776) and Ricardo (1817) growth is associated with the specialization of products. Heckscher-Ohlin trade model emphasizes on the specialization in which a country has skilled workforce (Ferreira, 2009). According to Structuralist theories (Chenery et al., 1979; Syrquin & Chenery, 1989), during 1950's and

1960's, if developing countries adopt policy of specialization, it will cause limited number of exportable primary products, resulting in limited economic growth. The shift in composition of exports from primary products to manufactured goods is important for steady economic growth (Aditya & Acharyya, 2011). The difference between developed and developing countries is that the developing countries follow export diversification and the developed nations adopt specialized productivity (Talor, 2008; Aditya & Acharyya, 2011; Naude & Rossouw, 2011; Persson & Wilhelmsson, 2013). However, shifting the pattern of diversification from differential products to homogenous product was observed in the countries with high per capita income (Besedes, 2010).

Mix results between the relationship of export composition and economic growth raise the question about selection of an appropriate policy for a country to achieve economic growth. The objective of this study is to analyze export composition and its impact on economic growth in South Asian countries (Bangladesh, India, Pakistan, and Sri Lanka) from 1990 to 2013. The specific objectives of this study are, to examine the export composition (diversified or specialized) and its impact on economic growth, secondly to examine the relationship between vertical and horizontal export diversification on economic growth

According to the available information, few studies were conducted which analyzed the type of export composition and its impact on economic growth, especially on South Asian countries. Besides, the impact of two categories of export diversification: vertical and horizontal export diversification on economic growth was analyzed only on time series data. This study is useful in drawing long run conclusions and outlining the level of dependence on diversification in exports. Various policies will be provided by the study to boost the potential level of exports in South Asian countries.

The remainder of the paper is organized in the following manner. Previous literature is discussed in Section 2. Model, methodology and data are described in section 3. The empirical results on export composition, vertical and horizontal export diversification are analyzed in section 4. Section 5 contains concluding remarks and policy recommendations.

## **2. Literature Review**

Akbar, Naqvi, and Din (2000) analyzed the export and growth relationship including diversification and structural changes in the exports of Pakistan from 1972-73 to 1997-98. It was

found that the first degree of exports diversification sharply increased from 1979 to 1985 and there was significant reduction in exports diversification in 1979 during democracy regime. It was also found that during the economic boom, there was short run exports diversification pattern. Stanley and Bunnag (2001) analyzed the trend of exports diversification in Costa Rica, El Salvador, Honduras and Guatemala during 1974-1995. It was found that Costa Rica and Honduras had greater stability of foreign earning in recent years because of diversified export products and market. Primary products of the countries still have dominance in export portfolio. Herzer and Lehmann (2006) analyzed both patterns of exports: horizontal and vertical diversification in the case of Chile. The model includes public knowledge: learning by doing and learning by exporting in the manufacturing sector. It produces a positive relationship between export diversification and economic growth and it creates positive externalities by learning by doing and learning by exporting. Vertical export diversification causes rapid expansion in certain resource based industries such as export of food products and feedstock.

Hummels and Klenow (2005) considered 185 countries: 126 exporting and 59 importing countries in 5000 products categories for analysis of the intensive margin and extensive margin. Four models were utilized: Armington, Acemoglu and Ventura, Krugman and Quality differentiation. There was 62% greater export of large economies under the extensive margin and 9% of country differences in real income per worker when they had quality differences. No product differential in extensive margin was found under the Armington model. Richer countries export high quantity with modest higher prices referring to intensive margin. Ferreira (2009) evaluate that whether there was positive effect of export diversification on long run economic growth or not? For this purpose, casual relationship between export and economic growth and Granger-causality were used for the time period 1965 and 1960-2007. It is found that horizontal and vertical diversification negatively impact on economic growth. FDI significantly impact on the high-tech sectors of the country. It was also found that after adopting liberalization policy in 1980, because of promoting export diversification that lead to the economic growth and several other incentives for example, capital inflow, stability and growth were achieved.

Benedictis et al. (2009) evaluated diversification and economic path from 1985 to 2001. The nonparametric technique was used for exploring the shape and statistical significance of the relationship between specialization and income. It was clearly found that as countries move towards the overall specialization, they grow more rapidly. However, some of the countries

diversify in their path of economic development that is an early phase of growth and economic development but it leads to the specialization on a later stage. Therefore, diversification in export is the early path of the development. Besedes (2010) considered three main types of the products that bring change in the structure of exports: homogenous goods, reference priced goods and differentiated products in 17 economies of Central and Eastern Europe between 1995 and 2008. Extensive margin is increased in all three products, both in larger and richer countries. Some of the countries increased the number of partners in their export products and some countries increased the number of export products. Jarreau and Poncet (2011) focused on the export sophistication and its impact on the economic activities in case of China. It was found that substantial variation exists in export sophistication at the province and prefecture level for controlling the level of development, and that this sophistication, in turn drives growth. Furthermore, the gain from domestic firms could be through ordinary export activities.

Paulino (2011) analyzed the pattern of specialization in Brazil, China, India and South Africa from 1992 to 2004. It was found that there were differences in the export productivity and specialization patterns across the countries. Developing countries follow export diversification and developed nations specialize productivity. Growth would not rely on the level of export and its volume but the type of specialization patterns. Munemo (2011) analyzed the effect of foreign aid on export diversification in the developing countries from 1980 to 2003. To identify the effect of other variables for determining the level of export diversification in the countries, Herfindahl index (HI) and share of manufactured exports in GDP was used. It was found that the countries which have more than 20% share of foreign direct investment or foreign aid in GDP, had significantly increased their export diversification. On the-contrary, foreign aid can be anti-export bias because of Dutch disease, but in lower income countries it plays a significant positive role for growth and enhances the export diversification. The other factors play their role in development and export diversification such as: infrastructure, transportation cost and natural resources. Chenaf and Rougier (2011) measured the effects of exports diversification and foreign direct investment on economic growth on the Middle East and North African (MENA). The priority goal of less developing countries especially in MENA countries is to increase the export diversification. It was found that there is joint exports and imports effect on growth, where imports were the source of technology spillover in the developing countries and facilitate global integration.

Lee (2011) highlighted the question that which technological characteristics most significantly affect the export that causes economic growth. To measure the export specialization, the Balassa index was used for 71 countries from the period beginning in 1970-1974 and 2000-2004. It was found that the most beneficial product for export is specialization and gain expertise in manufacturing in a specific product. Export structure from 1970 was changed and patterns show that countries move towards the specialization and successfully collaborate with the global economy especially in East Asian countries. Aditya and Acharyya (2011) evaluated the composition of economic growth and export diversification for 65 countries from 1965 to 2005. The study concludes that economic growth increases with the growth in export diversification up to a critical point, after that, the increase in specialization leads to increase in the high growth. Minondo (2011) evaluate that whether the comparative advantage increase the diversification in 91 countries from 1980 to 2000. Theil index, herfindahl index and gini coefficient are used for measuring the export diversification. Results showed that comparative advantage plays a vital role in explaining the export diversification; however, diversification still might not be the outcome of the process of development. It was found that specialized product development could be easily achieved in a country where specific skills were available.

Naude and Rossouw (2011) focused on the relationship between export diversification and economic growth especially in case of Brazil, China, India and South Africa from 1962 to 2000. Both similarities and differences were observed in the countries' diversification patterns. China and South Africa showed the U-shaped relationship between income and export specialization. Economic growth and diversification showed positive relationship in South Africa, whereas Brazil, China and India illustrated that export specialization to be preferred. Study conclude that export diversification is important not only for emerging economies but for the economic development and growth as well, especially in low and middle income countries. Ghani et al. (2012) explored the determinants of market diversification by export oriented manufacture firms from 1983 to 1992. Results showed that different factors at firm's level such as age of the enterprises, managerial expertise, type of ownership and size of the business cause high profitability of the firm in a diverse market. Study concludes that the firm level capacity help in achieving export diversification in Pakistan.

Knight (2013) analyzed the export diversification pattern of European countries and explored the opportunities for rapid growth. The focus of European countries is to develop innovative strategy



that accommodates uncertain circumstances. The consideration of cultural demand and diversification programs in contest of Weber model of Wertrational explanatory framework were discussed. Investment drivers in a competitive environment were identified such as energy programs, especially photovoltaic that have potential to turn the individual value rational decision into collective disasters. Parteka and Tamberi (2013) searched on the relationship between GDP per capita and specialization. The analysis was based on different periods and cross sections of countries. The use of country fixed effect and flexible estimation and different specialization indexes were used that show U-shaped pattern. To measure the degree of diversification, Theil index and Gini index were used. It is concluded that a country could enjoy the economies of scale once its manufactured products were diversified. On the contrary, specialization plays its role while considering the size of the economy. Shepotylo (2013) analyzed the product diversification in Eastern Europe (EE) and Commonwealth of Independent States (CIS), and raised the question that does the composition of export in EE and CIS countries differ from rest of the world. 105 exporting and 137 importing countries for 10 broad products during the period from 2001 to 2007 were analyzed. The CIS countries lagged behind the region leader in terms of degree of export diversification. This was because the major exports in CIS countries were based on the raw material. On the other hand, in terms of geographical diversification, Belarus is the least diversified country.

Persson and Wilhelmsson (2013) considered the case of European Union countries during the period 1962 to 2007 and highlighted the question that if the export earnings or export volume were the source of economic growth or not? It was found that: there is inverted-U form pattern between the export diversification and economic progress in the low income countries, at the certain threshold level of income, export concentration / specialization has a positive role. They recommended that diversified exports should be preferred to increase the exports volume that ultimately leads to economic development. Elhiraika and Mbate (2014) focused on the export diversification and its impact on the economic growth for African countries. The main objective of the paper was to evaluate the determinants of export diversification that contribute positively on it in the long-run. GMM methodology is adopted for 53 African countries from 1995 to 2011. It was concluded that per capita income, infrastructure, public investment, human capital and institutional framework, significantly contribute in the export diversification.

There are four major concepts that came upfront in the literature review. First, the degree of export diversification depends on the economic size and social capability of the country (Parteka & Tamberi, 2013; Talor, 2008). The difference between developed and developing countries is that developing countries follow export diversification and developed nations adopt specialized productivity (Persson & Wilhelmsson, 2013; Aditya & Acharyya, 2011; Naude & Rossouw, 2011; Benedictis et al, 2009; Talor, 2008). Second, export composition is different productive techniques and transformation of traditional style to modern techniques. It is measured with the help of Index such as: herfindahl index (Minondo, 2011; Ferreira, 2009; Matthee & Naude, 2007;), concentration index (Aditya & Acharyya, 2011) and normalised-hirschmann (Matthee & Naude, 2007). Export diversification is an important source of economic growth and significantly influences the GDP positively (Elhiraika and Mbate, 2014; Shepotylo, 2013; Knight 2013; Paulino, 2011; Aditya & Acharyya, 2011; Naude & Rossouw, 2011; Jarreau & Poncet, 2011; Besedes, 2010; Benedictis et al, 2009; Webb, 2005; Stanley & Bunnag 2001; Akbar & Naqvi, 2000). It creates positive externalities through leaning by doing and learning by exporting (Herzer & Lehmann, 2006). Third, non-linear relationship between export diversification and economic growth was tested and it was found that there exists an inverted U-shape relationship between economic growth and export diversification (Persson & Wilhelmsson, 2013; Benedictis et al, 2009; Ferriera, 2009) and some studies found that there was U-shape relationship between economic growth and export diversification (Persson & Wilhelmsson 2013; Aditya & Acharyya, 2011; Hesse, 2008). Fourth, there are two types of export diversifications: horizontal exports and vertical exports. Empirically it was found that horizontal export diversification and vertical export diversification have positive and significant impact on economic growth (Herzer and Lehmann, 2006). On the contrary, Ferreira (2009) found that horizontal and vertical export diversification has negative impact on economic growth.

Literature provides both positive and negative impacts of export composition (diversify or specialize) on economic growth. In case of non-linear relationship, empirically both inverted U and U-shape relationship of export diversification and export specialization found. The two types of export diversification also reveal contradicting results, both found positive and negative impact on economic growth. Therefore, it is important to analyze the type of export composition and its impact on economic growth, especially in South Asian countries.

### **3. Model, Methodology and Data**

### 3.1 The Model

The study used the augmented Cobb Douglas production function, in which output is the function of two major input factors: labor and capital, along with it the augmented factor is export. Following export led growth hypothesis (Ahumada & Sanguinetti, 1995; Ibrahim, 2002; Awokuse, 2003; Shirazi & Manap, 2005; Afzal et al., 2009; Dreger & Herzer, 2011; Palley, 2011; Araujo & Soares, 2011; Kubo, 2011; Abbas, 2012) the basic model can be defined as:

$$Y_{ft} = f_{ft}(K_{ft}, L_{ft}, X_t) \quad (1)$$

Where, Y is output, K is capital stock, L is labor employed, X is exports, t is time period, and f is sector.

The new growth theory emphasizes on the export composition (aggregate or disaggregate) and increase in the productivity. Change in the export composition refers to diversification or specialization. Specialization and limited number of exports commodities tend to increase the economic growth (Benedictis et al, 2009; Besedes, 2010; Persson & Wilhelmsson, 2013; Romer, 1990; Talor, 2008). Export diversification helps in stabilizing the export earnings and a source of economic growth (Akbar & Naqvi, 2000; Besedes, 2010; Paulino, 2011; Lee, 2011; Aditya & Acharyya, 2011; Naude & Rossouw, 2011). Export composition is endogenously determined (Hesse, 2008) as:

$$X_t = f(XC_t) \quad (2)$$

Where, X is exports, XC is export composition

From equation (1) we get:

$$Y_{ft} = f_{ft}(K_{ft}, L_{ft}, XC_t) \quad (3)$$

It is assumed that all variables are endogenously determined and all the firms are operating under perfect competition and they are price takers, therefore  $f_{ft}$  is performing as constant return to scale in the production function and there is one firm in each sector. Hence,

$$Y_t = \sum Y_{ft} \quad K_t = \sum K_{ft} \quad L_t = \sum L_{ft} \quad (4)$$

Hence equation (3) becomes:

$$Y_t = f_t(K_t, L_t, XC_t) \quad (5a)$$

$$Y_t = K_t^{\alpha_1} L_t^{\alpha_2} X C_t^{\alpha_3} \quad (5b)$$

Following Herzer and Lehnmann (2006) externalities of aggregate knowledge generated by export composition as:

$$Y_{ft} = f_{ft}(K_{ft}, L_{ft}, W_t) \quad (6)$$

Where,  $Y$  is output,  $K$  is capital stock,  $L$  is labor employed,  $W$  is level of aggregate knowledge generated through learning by-exporting or learning by-doing activities,  $t$  is time period, and  $f$  is sector.

Learning by exporting refers to the knowledge of exporters, gained from the foreign purchasers. Because of improved management skills and production technique's spillover effect, foreign purchases increase which increases the production and knowledge of the exporter, thus learning by exporting increases. It is assumed that each export sector produces public knowledge. Export sector and public knowledge produces the aggregate knowledge as:

$$W_t = Z_t W_{et} \quad (7)$$

Where,  $W_t$  is aggregate knowledge,  $W_{et}$  is public knowledge that cannot be directly observable so it is taken as a constant parameter, and  $Z_t$  is total number of export sectors.

The aggregate knowledge is the function of number of export sectors without constant parameter, presented as:

$$W_t = G(Z_t) \quad (8)$$

Herzer and Lehnmann (2006) argued that knowledge can be created while manufactured exports (% of merchandise exports) increases. The total number of sectors could be replaced by the manufactured exports. Hence, the manufactured export is introduced in the equation (8) as:

$$W_t = G(IX_t) \quad (9)$$

Therefore, equation (6) can be written as:

$$Y_t = f_t(K_t, L_t, W_t) \quad (10)$$

From equation (8), we get

$$Y_t = f_t(K_t, L_t) G(Z_t) \quad (11a)$$

$$Y_t = K_t^{\beta_1} L_t^{\beta_2} Z_t^{\beta_3} \quad (11b)$$

From equation (9), we get

$$Y_t = f_t(K_t, L_t) G(IX_t) \quad (12a)$$

$$Y_t = K_t^{\delta_1} L_t^{\delta_2} IX_t^{\delta_3} \quad (12b)$$

## 3.2 Methodology

### 3.2.1 Econometric Model

There are three econometric models. First model includes the export composition index, second model includes the vertical export diversification and third model includes the horizontal export diversification in the Cobb Douglas production function.

#### 3.2.1.1 Model with Export Composition

Export composition is the broader view of economic export activities, it includes two aspects: first, diversification and second, specialization. Export herfindahl concentration index is used to measure whether countries exports are moving towards diversification or specialization. It is based on industry concentration and its value ranges from zero to one. If the value is closer to zero, it represents that the countries' exports diversify. On the contrary, if the value is closer to one, it means that countries' exports are limited group of products or trend to specialize (Ferreira, 2009; Matthee & Naude, 2007). The index is computed as:

$$H_t = \frac{\sqrt{\sum_{i=1}^n (\frac{x_{it}}{X_t})^2} - \sqrt{1/n}}{1 - \sqrt{1/n}}$$

Where, H is export herfindahl concentration index, x is value of exports, n is total number of sector, and X is  $\sum_{i=1}^n x_{it}$ .

In the empirical literature, it was found that economic growth increases with the growth in export diversification upto a critical point, after that, the diversification will not positively impact on economic growth (Aditya & Acharyya, 2011). A nonlinear relationship between export specialization and economic growth was observed (Naude & Rossouw, 2011). Therefore, it is important to examine the nonlinear relationship between export composition and economic

growth. The square term of herfindahl index is introduced in the econometric model from equation (5b) as (Stewart, 2010) <sup>1</sup>:

$$\ln Y_t = \alpha_1 + \alpha_2 \ln K_t + \alpha_3 \ln L_t + \alpha_4 H_t + \alpha_5 H_t^2 + e_t \quad (13)$$

Where, Y is total output, K is capital, L is labor force, H is herfindahl index,  $\alpha_2$ ,  $\alpha_3$ ,  $\alpha_4$  and  $\alpha_5$  are coefficients of capital, labor force, herfindahl index and square term of herfindahl index respectively, and e is error term.

The hypothesis of export composition led economic growth is:

$$H_0: \alpha_4 = 0$$

$$H_1: \alpha_4 \neq 0$$

and

$$H_0: \alpha_5 = 0$$

$$H_1: \alpha_5 \neq 0$$

If  $\alpha_4$  has positive sign and  $\alpha_5$  has negative sign, it represents that there is inverted U relationship between economic growth and herfindahl index. If,  $\alpha_4$  has negative sign and  $\alpha_5$  has positive sign, it represents that the herfindahl index and economic growth has U shape relationship.

### 3.2.1.2 Model with Vertical Export Diversification

Vertical exports diversification refers to the increase in the value of exiting commodity with the help of creativity and innovation. It is the source of shifting from primary commodity to manufactured commodity and can be measured as manufactured exports (% of merchandise exports). To examine the nonlinear relationship between vertical exports diversification and economic growth, the square term of vertical exports diversification is introduced in the econometric model (Salvadori & Opocher, 2009). The econometric model for vertical export diversification from equation (12b) is as follow:

$$\ln Y_t = \beta_1 + \beta_2 \ln K_t + \beta_3 \ln L_t + \beta_4 \ln IX_t + \beta_5 (\ln IX_t)^2 + e_t \quad (14)$$

Where, Y is total output, K is capital, L is labor force, IX is the proxy of aggregate knowledge of learning by doing (Herzer & Lehmann, 2006).  $\beta_2$ ,  $\beta_3$ ,  $\beta_4$  and  $\beta_5$  are coefficients of capital, labor

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<sup>1</sup>  $\lim_{x \rightarrow 0^+} \ln x = -\infty$   
 $\lim_{x \rightarrow 1} \ln x = 0$

force, vertical exports diversification and square term of vertical exports diversification respectively, and  $e$  is error term.

The hypothesis for the vertical export diversification is as follows:

$$H_0: \beta_4 = 0$$

$$H_1: \beta_4 \neq 0$$

and

$$H_0: \beta_5 = 0$$

$$H_1: \beta_5 \neq 0$$

If  $\beta_4$  has positive sign and  $\beta_5$  has negative sign, it represents that there is inverted U relationship between economic growth and vertical export. If  $\beta_4$  has negative sign and  $\beta_5$  has positive sign, it represents that the vertical export and economic growth has U shape relationship.

### 3.2.1.3 Model with Horizontal Export Diversification

Horizontal export diversification refers to primary export-mix in such a form that reduces the volatility of international commodity prices or adopting and introducing new sectors in exports. To examine the nonlinear relationship between horizontal export diversification and economic growth, the square term of horizontal export diversification is introduced in the econometric model (Salvadori & Opocher, 2009). The econometric model for horizontal diversification from equation (11b) is as follow:

$$\ln Y_t = \delta_1 + \delta_2 \ln K_t + \delta_3 \ln L_t + \delta_4 \ln Z_t + \delta_5 (\ln Z_t)^2 + e_t \quad (15)$$

Where,  $Y$  is total output,  $K$  is capital,  $L$  is labor force,  $Z$  is the proxy of aggregate knowledge of learning by exporting (Herzer & Lehmann, 2006).  $\delta_2$ ,  $\delta_3$ ,  $\delta_4$  and  $\delta_5$  are coefficients of capital, labor force, horizontal export diversification and square term of horizontal export diversification respectively, and  $e$  is error term.

The hypothesis for the horizontal export diversification is as follows:

$$H_0: \delta_4 = 0$$

$$H_1: \delta_4 \neq 0$$

and

$$H_0: \delta_5 = 0$$

$$H_1: \delta_5 \neq 0$$

If  $\delta_4$  has positive sign and  $\delta_5$  has negative sign, it represents that there is inverted U relationship between economic growth and vertical export diversification. If  $\delta_4$  has negative and  $\delta_5$  has positive signs, it represents that the horizontal export diversification and economic growth have U shape relationship.

### **3.2.2 Panel Data Framework**

This study uses panel data because it provides data variation along with more degrees of freedom. It controls unobservable heterogeneity in the data set (Gujarati, 2003). More accurate inferences can be achieved as estimate of variability becomes more precise by using panel data. It is well-suited for measuring effects which are difficult to be observed in time series and cross-sectional data (Gujarati, 2003). There are three alternative methods to estimate panel data characteristics: pooled OLS, fixed effect least square dummy variable model, and random effect model. This study utilizes panel data with four cross sections from 1990 to 2013 at annual frequency. The number of time series data is more than the number of cross sectional units. Therefore, the most suitable technique to estimate the model of this study is fixed effect model as compared to all the other models.

### **3.3 Data**

The study focuses on four countries of South Asia i.e. Bangladesh, India, Pakistan and Sri Lanka, and the time period is annual from 1990 to 2013. Data for horizontal export i.e total number of sector (Z) and export of each sector ( $x_{it}$ ) are collected from United Nations Commodity Trade Statistics Database (COMTRADE) with SITIC digit 3. Gross domestic product (constant 2005 US\$) (Y), total employed labor force (L), gross fixed capital formation (constant 2005 US\$) (K) and manufactured exports (% of merchandise export) (IX) are collected from the World Development Indicator (WDI).

## **4. Results**

### **4.1 Results of Model with Export Composition**

The primary objective of the study is to estimate the relationship between economic growth and exports composition (diversification or specialization). The results of fixed effect model are presented in table 4.1. Results indicate that the GDP is positively related with capital (K) and labor (L). Herfindahl index (H) is positively related with economic growth. Its mean that export



diversification lead to economic growth. The square term of herfindahl index is negatively related to economic growth indicate that there is inverted U relationship between economic growth and herfindahl index. It shows that diversification is positively related with economic growth via leaning by doing upto a critical point, after that specialization would be beneficial to economic growth. Mathee and Naude (2007), Aditya and Acharyya (2011), Minondo (2011), Munemo (2011), Naude and Rossow (2011), Paulino (2011), Parteka and Temberi (2013) and Elhiraika and Mbate (2014) found the same results that exports diversification is positively related with economic growth in the developing countries.

*Table 4.1: Model with Herfindahl Index*

<b>Variables (Dependent variable is GDP)</b>	<b>Coefficient</b>
LnK	0.5262* (0.0116)
Lnlab	0.8745* (0.0316)
H	2.0380* (0.6533)
H <sup>2</sup>	-4.4467* (1.2606)
Constant	2.518* (0.1867)
Bangladesh	-0.2660
India	-0.9332
Pakistan	0.2189
Sri Lanka	0.9803
R-Sq	0.9879

Note: \* indicates 1level of significance. Standard errors are in parenthesis.

Aditya and Acharyya (2011) supports the results that inverted U relationship exist between export diversification with economic growth. They also find that India and Sri Lanka are the fastest growing countries in South Asia and they diversified their exports over time and now these countries exports are closer to the concentration. The results indicate that economic growth is not only depends on the trade volume but export composition does hold importance. Herfindahl index highlights the countries initial condition and their development path that exports diversification leads to economic growth. Although export diversification is positively

related with economic growth countries need to develop effective industrial and diversification strategies. Wide range of exported goods in export portfolio could increase possibility of development and foster the process of accumulation of aggregate knowledge (Parteka & Temberi, 2013). There are two possibilities to increase in the export diversification; first increase the non-traditional exports and reduce the level of traditional exports. Second, increase non-traditional exports and sustain the level of traditional exports (Naude & Rossow, 2011). Inverted U relationship helps in developing long term policies that could be implemented in industrial sector of the countries to accelerate the economic growth (Elhiraika & Mbate, 2014).

#### **4.2 Results of Model with Vertical Export Diversification**

Second objective of the study is to analyze the impact of vertical export diversification on economic growth. Vertical export diversification is generated in the economy through positive externalities “learning by doing” and refers to the increase in the value of existing commodity through innovation and creativity. Mengistu (2009) argued that vertical export diversification is an essential component of economic growth. Vertical export diversification is measured with help of manufactured exports (% of merchandise exports). The estimated results of model with vertical export diversification are presented in table 4.2.

Results show that GDP is positively related with capital (K), labor (L) and vertical export diversification (IX). The square term of vertical export diversification is negatively related with economic growth indicating that there is inverted U relationship. Inverted U relationship between GDP and vertical export diversification shows that IX is positively related with economic growth up to a critical point (i.e. peak of the curve), after which, increase in the manufactured exports would not benefit the economic growth. The positive relationship of manufactured exports (% of merchandise) with economic growth explicate that countries are moving towards non-traditional exports from traditional exports. Export diversification increases the industrial export with the help of higher technology. Countries should focus on non-traditional exports instead of traditional exports (Herzer & Lehmann, 2006). Increase in the manufactured exports could lead to higher economic growth (Naude & Rossow, 2011).

Table 4.2: Model with Vertical Exports Diversification

Variables (Dependent variable is GDP)	Coefficient
LnK	0.5334* (0.0162)
Lnlab	0.7624* (0.0475)
LnIX	11.0048* (3.2062)
(lnIX) <sup>2</sup>	-1.3240* (0.3739)
Constant	-19.7047* (6.8874)
Bangladesh	-0.2302
India	-0.7652
Pakistan	0.2373
Sri Lanka	0.7581
R-Sq	0.9985

Note: \* indicates 1level of significance. Standard errors are in parenthesis.

#### 4.3 Results of Model with Horizontal Export Diversification

Horizontal export diversification reduces the volatility of international commodity prices by adopting and introducing new sectors in exports (Ferreira, 2009). It also refers to “learning by exporting”. Total number of export sectors (Z) produces the same amount of knowledge through learning by exporting. It measures completely new export sector that generates positive externality. It is the source of reducing the dependence level of a country that offers limited number of commodities in the export sector. The estimated results of model with horizontal export diversification are presented in table 4.3.

It is found that GDP is positively related with capital (K) and labor (L). Horizontal export diversification is negatively related with economic growth. This implies that increase in the total number of sector is not beneficial for economic growth. The square term of horizontal export diversification is positively related with economic growth indicate that there is U shape relationship. Horizontal exports initially impact negatively on the economic growth up to a critical point, after that, it positively influence the economic growth. Same results found by

Ferreira (2009) that negative impact of total number of sectors (Z) in the economy in case of Costa Rica. Besedes (2010) argued that the shifting of diversification pattern was only observed in richer countries.

*Table 4.3: Model with Horizontal Exports Diversification*

<b>Variables (Dependent variable is GDP)</b>	<b>Coefficient</b>
LnK	0.5476* (0.0138)
Lnlab	0.9048* (0.0533)
LnZ	-4.4182* (1.2889)
(LnZ) <sup>2</sup>	0.4008* (0.1272)
Constant	14.5370* (3.3368)
Bangladesh	-0.3808
India	-1.0181
Pakistan	0.2731
Sri Lanka	1.1257
R-Sq	0.9989

Note: \* indicates 1level of significance. Standard errors are in parenthesis.

The implementation of negative impact of horizontal export diversification is that increase in the manufacture exports in the existing sector would lead to economic growth instead of introducing a new sector in the economy. Horizontal export diversification is based on advance technology, innovation and creativity and such products manufacture in developed countries. Advance technological products are from developed countries (Ferreira, 2009). Once developing countries such as South Asia countries able to develop sufficient resources in manufacture exports then could able to increase in the sector that lead to the economic growth (Ferreira, 2009).

## **5. Conclusion**

The main objective of this study is to analyze the impact of export composition on economic growth. This study also analyzed the impact of vertical and horizontal export diversification on economic growth. This study focuses on four countries of the South Asia i.e. Bangladesh, India,

Pakistan and Sri Lanka, and the time period is annual from 1990 to 2013. Remaining countries of South Asian were not included because of unavailability of data. The study uses panel data because it provides more efficient results along with information of country specific characteristics.

This study use augmented Cobb-Douglas production function, in which export is augmented in the production function. In the first model export composition and its square term is augmented. In the second model, vertical export diversification and its square term is introduced. Third model includes horizontal export diversification and its square terms. The square term is used to analyze the non-linear relationship of the explanatory variables that whether the variable has inverted U shape or U-shape relationship with economic growth.

In the first model, export composition is measured with the help of herfindahl index. Its value is closer to zero presenting that export diversification exist in the region. Results show that herfindahl index and GDP have positive relationship. The square term of herfindahl index has negative sign which represents inverted U relationship of export diversification with economic growth. It shows that initially increase in export diversification would lead to high economic growth but after the threshold level, export specialization have positive impact on economic growth in South Asian countries. Diversification in the export portfolio (traditional and non-traditional exports) leads to increase in GDP.

In the second model, vertical export diversification is measured with the help of manufacture exports (% of merchandise exports). Results show that vertical export diversification is positively related with economic growth. The square term of manufactured exports (% of merchandise exports) negatively related with GDP represents that vertical export diversification has inverted U-shape relationship. Vertical export diversification linked with economic growth via externalities of learning by doing. Moving from primary exports to manufacture exports lead to improved production technique and more efficient management style benefit to the economy as a whole.

In the third model, horizontal export diversification (learning by exporting) is measured with the help of total number of sectors in the economy with 3-digit SITC. The model finds that there is negative relationship between horizontal export diversification and economic growth which means that horizontal export diversification is not the source of economic growth. The square

term of horizontal export diversification is positively related with economic growth represents U-shape relationship. Initially increase in the total number of sectors would not benefit but after the threshold level, introducing a new sector is the source of economic growth in South Asian countries.

On the basis of the finding of the study, following are the policy recommendations:

- Education and skill formation are essential components for creativity and innovation, so the focus on labor training and education is important.
- Government should encourage the exporters to increase diversification in their export portfolio.
- Government should provide incentives and technical assistance for research and development in the manufactured sector.

There are certain limitations of the study, which, if considered, could expand the scope of study, these are:

- The study used only four countries due to non-availability of data.
- Other variables such as: foreign direct investment, human capital, imports, government expenditure, quality of institution and political regime can be included as explanatory variables.

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